CLAIMS

We claim:

1. A method for treating a subject suffering or prone to suffering from a condition characterized by aberrant axonal outgrowth of central nervous system neurons, comprising administering to said subject a compound that modulates the activity of N-kinase, thereby treating the subject suffering or prone to suffering from a condition characterized by aberrant axonal outgrowth of central nervous system neurons.

2. The method of claim 1, wherein the condition characterized by aberrant axonal outgrowth of central nervous system neurons is spinal cord injury.

3. The method of claim 2, wherein the spinal cord injury is selected from the group consisting of monoplegia, diplegia, paraplegia, hemiplegia and quadriplegia.

4. The method of claim 1, wherein the condition characterized by aberrant axonal outgrowth of central nervous system neurons is epilepsy.

5. The method of claim 4, wherein the epilepsy is posttraumatic epilepsy.

6. The method of claim 1, wherein the condition characterized by aberrant axonal outgrowth of central nervous system neurons is neuropathic pain syndrome.

7. The method of claim 1, wherein the compound that modulates the activity of N-kinase is administered by introduction into the central nervous system of the subject.

8. The method of claim 1, wherein the compound that modulates the activity of N-kinase is introduced into the cerebrospinal fluid of the subject.

9. The method of claim 1, wherein the compound that modulates the activity of N-kinase is introduced to the subject intrathecally.

10. The method of claim 1, wherein the compound that modulates the activity of N-kinase is introduced into a cerebral ventricle of the subject.

11. The method of claim 1, wherein the compound that modulates the activity of N-kinase is introduced into the lumbar area of the subject.

12. The method of claim 1, wherein the compound that modulates the activity of N-kinase is introduced into the cisterna magna of the subject.

13. The method of claim 1, wherein the compound that modulates the activity of N-kinase is administered to the subject in a pharmaceutically acceptable formulation.

14. The method of claim 13, wherein the pharmaceutically acceptable formulation is a dispersion system.

15. The method of claim 13, wherein the pharmaceutically acceptable formulation comprises a lipid-based formulation.

16. The method of claim 15, wherein the pharmaceutically acceptable formulation comprises a liposome formulation.

17. The method of claim 16 wherein the pharmaceutically acceptable formulation comprises a multivesicular liposome formulation.

18. The method of claim 13, wherein the pharmaceutically acceptable formulation comprises a polymeric matrix.

19. The method of claim 13, wherein the pharmaceutically acceptable formulation is contained within a minipump.

20. The method of claim 13, wherein the pharmaceutically acceptable formulation provides sustained delivery of the compound that modulates the activity of N-kinase, to a subject for at least one week after the pharmaceutically acceptable formulation is administered to the subject.

21. The method of claim 13, wherein the pharmaceutically acceptable formulation provides sustained delivery of the compound that modulates the activity of N-kinase, to a subject for at least one month after the pharmaceutically acceptable formulation is administered to the subject.

22. The method of claim 1, wherein the subject is a mammal.

23. The method of claim 22, wherein the mammal is a human.

24. The method of claim 1, wherein the central nervous system neurons are retinal ganglion cells.

25. A method for modulating axonal outgrowth of a central nervous system neuron, comprising contacting the central nervous system neuron with a compound that modulates the activity of N-kinase, thereby modulating axonal outgrowth of the central nervous system neuron.

26. The method of claim 25, wherein the outgrowth is stimulated.

27. The method of claim 25, wherein the outgrowth is inhibited.

28. The method of claim 25, wherein said central nervous system neurons are mammalian.

29. A method for modulating the axonal outgrowth of a central nervous system neuron in a subject, comprising administering to said subject a compound that modulates the activity of N-kinase, such that axonal outgrowth in the subject is modulated.

30. A method for identifying a compound that modulates axonal outgrowth of a central nervous system neuron, comprising contacting N-kinase with a test compound and determining the ability of the test compound to modulate the activity of N-kinase, thereby identifying a compound that modulates axonal outgrowth of a central nervous system neuron.

31. The method of claim 30, wherein the N-kinase is human N-kinase.

32. The method of claim 31, wherein the human N-kinase is a recombinantly produced N-kinase.

33. The method of claim 30, wherein the N-kinase is bovine N-kinase.

34. The method of claim 33, wherein the bovine N-kinase is purified from a bovine source.

35. The method of claim 30, further comprising determining the ability of the test compound to modulate axonal outgrowth of a central nervous system neuron.

36. The method of claim 30, wherein the test compound inhibits the activity.

37. The method of claim 30, wherein the test compound stimulates the activity.

38. The method of claim 30, wherein the ability of the test compound to modulate the activity of N-kinase is determined by assessing the ability of the test compound to modulate N-kinase dependent phosphorylation of a substrate.

39. A method for identifying a compound that modulates axonal outgrowth of a central nervous system neuron, comprising contacting N-kinase with a test compound, an N-kinase substrate, radioactive ATP, and Mn^{+2}; and determining the ability of the test compound to modulate N-kinase dependent phosphorylation of the substrate, thereby identifying a compound that modulates axonal outgrowth of a central nervous system neuron.

40. The method of claim 39, wherein the N-kinase substrate is a histone HF-1 protein.

41. The method of claim 39, wherein the radioactive ATP is [γ-^{32}P] ATP.

42. The method of claim 39, wherein the N-kinase is human N-kinase.

43. The method of claim 42, wherein the human N-kinase is a recombinantly produced N-kinase.

44. The method of claim 39, wherein the N-kinase is bovine N-kinase.

45. The method of claim 44, wherein the bovine N-kinase is purified from a bovine source.

46. The method of claim 39, further comprising determining the ability of the test compound to modulate axonal outgrowth of a central nervous system neuron.

47. A compound that modulates axonal outgrowth of a central nervous system neuron identified by the method of claim 30.

48. A compound that modulates axonal outgrowth of a central nervous system neuron identified by the method of claim 39.

49. An isolated N-kinase polypeptide of the type that:
(a) is present in neonatal brain tissue;
(b) is inhibited in the presence of 6-thioguanine;
(c) is activated by Mn^{+2} but not by Mg^{+2} or Ca^{+2};
(d) has a molecular weight of approximately 49 kDa; and
(e) is eluted from a Cibacron Blue column at a NaCl concentration of 1.5-1.75 M.

50. An antibody which is specifically reactive with an epitope of the N-kinase polypeptide of claim 49.

51. The antibody of claim 50, wherein the antibody is an intracellular antibody.

52. The antibody of claim 50, wherein the epitope comprises an ATP binding domain.

53. A fragment of the N-kinase polypeptide of claim 49, wherein the fragment comprises at least 15 contiguous amino acids.

54. The fragment of claim 53, wherein the fragment comprises at least 30 contiguous amino acids.

55. The fragment of claim 53, wherein the fragment comprises at least 50 contiguous amino acids.

56. The fragment of claim 53, wherein the fragment comprises at least 100 contiguous amino acids.

57. A fragment of the N-kinase polypeptide of claim 49, wherein the fragment is able to elicit an immune response.